

today calling for retreat would have scoffed.

However, the critics have consistently underestimated the Iraqi people, the American military, and, I might add, the American people as well. America must remain engaged in stabilization efforts in order to ensure the triumph of democracy over the return of tyranny.

Since the beginning of the war on terror, members of our military have been asked to execute both difficult and dangerous work. As always, the good men and women who serve have met these challenges with determination, courage, and honor. They are a credit to our Nation and deserve our deepest respect and gratitude.

We all know there remains difficult work to be done in Iraq. Terrorists regard this country as the central battle ground in the war on terror, and these enemies acknowledge no standards and no rules governing warfare. Their stated goal is to bring great harm to any government or country that opposes their actions. We in the United States, of course, are a primary target, and we must therefore continue to show leadership and courage in the fight.

Some critics have said that we should cut and run, that we should leave according to some arbitrary timetable, claiming that the Pentagon and the administration have failed to be realistic about the problems that exist in Iraq and the challenges that lie ahead. I firmly disagree.

President Bush and other members of the administration have consistently told the American people that our efforts in Iraq will require much sacrifice, but that we must stay the course. We must not let the politics of the moment undermine the path to democracy in Iraq. We should consider, though, the alternative: what would happen if our troops left Iraq prematurely. The country would likely face a civil war or would fragment in a dangerous way. Terrorists such as Ayman al-Zawahiri, al-Qaida's No. 2 operative and Bin Laden's deputy, and Abu Masab al-Zarqawi, al-Qaida's chief terrorist in Iraq, and others who vow to destroy America could be counted on to seize power in at least a portion of the country. At a minimum, they would find patronage in any regime to plan attacks and train terrorists and offer them harbor and material support.

The consequences of a U.S. pullout and coalition pullout from Iraq should not be in question, as a letter from Zawahiri and Zarqawi released this week by the Pentagon makes clear. In this letter, Zawahiri tells Zarqawi when the United States leaves Iraq that al-Qaida must be prepared to claim the most political territory possible in the inevitable vacuum of power that will arise.

Yes, Iraq would be more dangerous, not less, if we fail to finish the job. Failure in Iraq would empower and embolden the enemy. Failure to stay the

course and lay the foundation of a functioning democracy would result in more, not fewer, terrorist attacks, including here at home.

I must also express disappointment with those in this country who are trying to use the situation in Iraq to score political points or undermine America's resolve.

Last week, the leadership in the Senate on the other side of the aisle put out a statement claiming that we do not have a plan for victory in Iraq. Nothing could be further from the truth.

For the record, the Senate has been briefed numerous times by our military leadership regarding the plan in Iraq and the war on terror. This weekend's successful election was a key element in that plan to build a stable and self-governing Iraq. Sadly, the claim by political partisans that we do not have a plan in Iraq is nothing more than politics at its worst. To imply that our military leadership does not understand what it takes to win in Iraq is simply wrong and even insulting.

I trust the wisdom and experience of GEN John Abizaid and GEN George Casey over the many armchair generals inside the beltway who seem to pontificate with great frequency. They understand the facts on the ground and what is necessary to achieve victory.

Finally, some critics are fond of comparing Iraq to Vietnam. Yet the differences far outweigh the flawed comparisons some attempt to make. The only obvious and striking similarity is that the enemy is counting on American public opinion to force a retreat. In fact, Zawahiri noted in his letter that "we are in a battle and more than half of this battle is taking place in the battlefield of the media." Al-Qaida understands that they cannot win on the battlefield against the spirit of determination of America and our allies. Prematurely leaving Iraq would have catastrophic consequences far greater than those we saw in Vietnam, as retreat would, in effect, hand the Iraqi people over to the terrorists who have stated their intention and proven their ability to launch horrifying attacks.

Yes, we have seen significant progress in Iraq, and our confidence in the desire of the Iraqi people to self-govern is well placed as we have seen the value that they place on liberty. We have seen record numbers show up at the polls, more than 60 percent, despite threats of car bombs and other acts of terrorism. We have seen Iraqi elected officials vocally defend the values of freedom and democracy at their own peril. In 2½ years, this country has moved from the rule of a tyrant to implementing the rule of law. They have held national elections, and they were followed by the writing of a constitution. They are formulating their own military and security forces that grow more and more capable.

While much remains to be done, much has been accomplished. To ignore these strides forward would be to di-

minish the good work of both the Iraqi people and the United States and their contributions that have allowed this effort to occur. Yes, we must stay the course. In so doing we honor both the ideals upon which this great Nation was founded and our own national security interests. America has sacrificed much in this global war, and we do not yet know the trials that will come. We can be confident that there will be a struggle and a greater sacrifice, but we can also be confident that in the midst of this struggle and sacrifice there is hope.

We are encouraging democracy, freedom, progress, free markets, self-governance, and the rule of law and the Iraqi people are reaching out and taking hold of that hope.

So we must stand confident and strong, shoulder to shoulder with the Iraqi people in the defense of their nascent democracy, confident that freedom will, in the end, triumph.

I yield the floor.

The PRESIDING OFFICER (Mr. VOINOVICH). The Senator from Tennessee is recognized for up to 10 minutes.

Mr. ALEXANDER. I ask the Chair to inform me when I have 1 minute remaining.

The PRESIDING OFFICER. The Chair will so inform the Senator.

KEEPING OUR COMPETITIVE EDGE

Mr. ALEXANDER. Mr. President, in May, Senator JEFF BINGAMAN and I, with the encouragement of the Senate Energy Committee Chairman, PETE DOMENICI, asked the National Academies of Sciences and Engineering and the Institute of Medicine the following question: What are the top 10 actions, in priority order, that Federal policymakers could take over the next decade to help the United States keep our advantage in science and technology? That was our question.

To answer the question, the academies assembled a distinguished panel of business, government, and university leaders, headed by Norm Augustine, the former chair of Lockheed Martin. The panel also included three Nobel Prize laureates. The panel took our question seriously, and I intend to do everything within my power to take their recommendations seriously. Tomorrow, the Energy Committee will take the first step in that response by holding a hearing to hear from Mr. Augustine and the Academies. It will be the first opportunity Congress will have to hear their answer to our question.

This hearing is primarily about brainpower and the relationship of brainpower to good American jobs. The United States produces almost one-third of all the wealth in the world, in terms of gross domestic product but has only 5 percent of the world's population. We are a fortunate country indeed. The Academies explained this phenomenon in this way:

... as much as 85 percent of measured growth in U.S. income per capita is due to technological change.

This technological change is the result, in the report's words, of an outpouring of:

... well-trained people and the steady stream of scientific and technological innovations they produce.

The United States has taken extraordinary steps to help create this outpouring of trained people and new discoveries that have given us such a disproportionate share of the world's wealth. We have in our country almost all of the world's great research universities. We have a unique array of 36 Federal research laboratories. More Americans attend college than people in any other country, and the colleges they attend are the best in the world. We have had, until at least recently, a system of K-12 education unsurpassed in the world.

Government support for all these enterprises has been massive. In 2001, the Federal Government spent \$22.5 billion for university-based research in science and engineering. This year the Government will provide 60 percent of American students with grants or loans to help them attend the college or university of their choice. The Federal Government will spend nearly \$17 billion on grants and work-study programs and will provide an additional \$52 billion in student loans.

In my last year as Governor of Tennessee, and I am sure it must have been as true in Ohio as well, or nearly true, half of State dollars and a larger proportion of local tax dollars went to support education. Our free-market environment encouraged innovation and enterprise, as well as billions of dollars invested in corporate research. Finally, to top it all off, while we have been outsourcing jobs, we have been insourcing brainpower—572,000 foreign students attend our colleges and universities. One-half of the students in our graduate programs of engineering, science, and computing are foreign students.

There are three reasons I put this question to the National Academies. First, Congress is facing huge budget challenges over the next decade as we grapple with restraining the growth of entitlement spending. I did not want tight budgets to squeeze out the necessary investments in science and technology that create good jobs. Second, as the Augustine report details, there are worrisome reports from all sides in the new competitive world marketplace that the United States will have to make an even greater effort to keep our high standard of living. To put it bluntly, people in India, China, Singapore, Finland, and Ireland know very well that since their brains work similar to our brains, if brainpower is the secret weapon to produce good jobs, then there is no reason they can't have a standard of living more similar to ours. They are working to develop better trained citizens and create their own stream of discoveries.

Third, I wanted to ask this question to those who should know the answer. Members of Congress are not the best ones to guess what the first 10 things we should do are, in the next 10 years, to keep our science and technology edge. This panel represents the best of those brains. Congress is not efficiently organized to deal with broad recommendations such as these. I intend to work with my colleagues to see that all of the recommendations in the report are introduced and given a fair hearing in various committees that have jurisdiction. I see the senior Senator from Missouri and the Senator from Ohio. Both of them have been leaders in this body on this very question of how do we keep our secret weapon, our brainpower advantage, in order to keep good jobs.

But what should happen is that President Bush should make this report the subject of his State of the Union Address and the focus of his remaining 3 years in office. This challenge cries out for executive leadership. This challenge is the real answer to most of our hopes and the solution to most of our big problems. From high gasoline prices to the outsourcing of chemical industry jobs, from the shortage of engineers to the growing number of lower wage jobs, from energy independence to controlling health care costs, this is the challenge that most Americans wish their Government would put up front.

We have begun the discussion with a bipartisan question to the wisest Americans who know the answer. We have a remarkable opportunity now because of the Augustine report, upon which we will have our hearing tomorrow. We will have an opportunity now to act on the recommendations of that report in the same spirit.

Mr. President, I ask unanimous consent to have printed in the RECORD the following items: A copy of the executive summary of the Augustine report entitled "Rising Above the Gathering Storm." This is the report of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine—4 recommendations with 20 specific steps that we ought to take over the next 10 years to keep our brainpower advantage so we can keep good jobs. Second, I ask unanimous consent to have printed after that the article by Thomas L. Friedman in the New York Times, on October 14, called "Keeping Us in the Race," which is his commentary on the Augustine report.

There being no objection, the material was ordered to be printed in the RECORD, as follows:

RIISING ABOVE THE GATHERING STORM
COMMITTEE BIOGRAPHIC INFORMATION

NORMAN R. AUGUSTINE [NAE] (Chair) is the retired chairman and CEO of the Lockheed Martin Corporation. He serves on the President's Council of Advisors on Science and Technology and has served as undersecretary of the Army. He is a recipient of the National Medal of Technology.

CRAIG BARRETT [NAE] is chairman of the Board of the Intel Corporation.

GAIL CASSELL [IOM] is vice president for scientific affairs and a Distinguished Lilly Research Scholar for Infectious Diseases at Eli Lilly and Company.

STEVEN CHU [NAS] is the director of the E.O. Lawrence Berkeley National Laboratory. He was a cowinner of the Nobel prize in physics in 1997.

ROBERT GATES is the president of Texas A&M University and served as Director of Central Intelligence.

NANCY GRASMICK is the Maryland State Superintendent of Schools.

CHARLES HOLLIDAY JR. [NAE] is chairman of the Board and CEO of DuPont.

SHIRLEY ANN JACKSON [NAE] is president of Rensselaer Polytechnic Institute. She is the immediate past president of the American Association for the Advancement of Science and was chairman of the U.S. Nuclear Regulatory Commission.

ANITA K. JONES [NAE] is the Lawrence R. Quarles Professor of Engineering and Applied Science at the University of Virginia. She served as director of defense research and engineering at the U.S. Department of Defense and was vice-chair of the National Science Board.

JOSHUA LEDERBERG [NAS/IOM] is the Sackler Foundation Scholar at Rockefeller University in New York. He was a cowinner of the Nobel prize in physiology or medicine in 1958.

RICHARD LEVIN is president of Yale University and the Frederick William Beinecke Professor of Economics.

C.D. (DAN) MOTE JR. [NAE] is president of the University of Maryland and the Glenn L. Martin Institute Professor of Engineering.

CHERRY MURRAY [NAS/NAE] is the deputy director for science and technology at Lawrence Livermore National Laboratory. She was formerly the senior vice president at Bell Labs, Lucent Technologies.

PETER O'DONNELL JR. is president of the O'Donnell Foundation of Dallas, a private foundation that develops and funds model programs designed to strengthen engineering and science education and research.

LEE R. RAYMOND [NAE] is the chairman of the Board and CEO of Exxon Mobil Corporation.

ROBERT C. RICHARDSON [NAS] is the F.R. Newman Professor of Physics and the vice provost for research at Cornell University. He was a cowinner of the Nobel prize in physics in 1996.

P. ROY VAGELOS [NAS/IOM] is the retired chairman and CEO of Merck & Co., Inc. He serves as chairman of New Jersey's Commission on Jobs, Growth, and Economic Development.

CHARLES M. VEST [NAE] is president emeritus of MIT and a professor of mechanical engineering. He serves on the President's Council of Advisors on Science and Technology and is the immediate past chair of the Association of American Universities.

GEORGE M. WHITESIDES [NAS/NAE] is the Woodford L. & Ann A. Flowers University Professor at Harvard University. He has served as an adviser for the National Science Foundation and the Defense Advanced Research Projects Agency.

RICHARD N. ZARE [NAS] is the Marguerite Blake Wilbur Professor of Natural Science at Stanford University. He was chair of the National Science Board from 1996 to 1998.

FOR MORE INFORMATION: This report was developed under the aegis of the National Academies Committee on Science, Engineering, and Public Policy (COSEPP), a joint committee of the three honorific academies—the National Academy of Sciences [NAS], the National Academy of Engineering [NAE], and the Institute of Medicine [IOM]. Its overall charge is to address cross-cutting

issues in science and technology policy that affect the health of the national research enterprise.

More information, including the full body of the report, is available at COSEPUP's Web site, www.nationalacademies.org/cosepup.

EXECUTIVE SUMMARY

The United States takes deserved pride in the vitality of its economy, which forms the foundation of our high quality of life, our national security, and our hope that our children and grandchildren will inherit ever-greater opportunities. That vitality is derived in large part from the productivity of well-trained people and the steady stream of scientific and technical innovations they produce. Without high-quality, knowledge-intensive jobs and the innovative enterprises that lead to discovery and new technology, our economy will suffer and our people will face a lower standard of living. Economic studies conducted before the information-technology revolution have shown that even then as much as 85% of measured growth in U.S. income per capita is due to technological change.

Today, Americans are feeling the gradual and subtle effects of globalization that challenge the economic and strategic leadership that the United States has enjoyed since World War II. A substantial portion of our workforce finds itself in direct competition for jobs with lower-wage workers around the globe, and leading-edge scientific and engineering work is being accomplished in many parts of the world. Thanks to globalization, driven by modern communications and other advances, workers in virtually every sector must now face competitors who live just a mouse-click away in Ireland, Finland, China, India, or dozens of other nations whose economies are growing.

CHARGE TO THE COMMITTEE

The National Academies was asked by Senator Lamar Alexander and Senator Jeff Bingaman of the Committee on Energy and Natural Resources, with endorsement by Representatives Sherwood Boehlert and Bart Gordon of the House Committee on Science, to respond to the following questions: What are the top 10 actions, in priority order, that federal policy-makers could take to enhance the science and technology enterprise so that the United States can successfully compete, prosper, and be secure in the global community of the 21st Century? What strategy, with several concrete steps, could be used to implement each of those actions?

The National Academies created the Committee on Prosperity in the Global Economy of the 21st Century to respond to this request. The charge constitutes a challenge both daunting and exhilarating: To recommend to the Nation specific steps that can best strengthen the quality of life in America—our prosperity, our health, and our security. The committee has been cautious in its analysis of information. However, the available information is only partly adequate for the committee's needs. In addition, the time allotted to develop the report (10 weeks from the time of the committee's meeting to report release) limited the ability of the committee to conduct a thorough analysis. Even if unlimited time were available, definitive analyses on many issues are not possible given the uncertainties involved.

This report reflects the consensus views and judgment of the committee members. Although the committee includes leaders in academe, industry, and government—several current and former industry chief executive officers, university presidents, researchers (including three Nobel prize winners), and former presidential appointees—the array of topics and policies covered is so broad that it

was not possible to assemble a committee of 20 members with direct expertise in each relevant area. Because of those limitations, the committee has relied heavily on the judgment of many experts in the study's focus groups, additional consultations via e-mail and telephone with other experts, and an unusually large panel of reviewers. Although other solutions are undoubtedly possible, the committee believes that its recommendations, if implemented, will help the United States achieve prosperity in the 21st century.

FINDINGS

Having reviewed trends in the United States and abroad, the committee is deeply concerned that the scientific and technical building blocks of our economic leadership are eroding at a time when many other nations are gathering strength. We strongly believe that a worldwide strengthening will benefit the world's economy—particularly in the creation of jobs in countries that are far less well-off than the United States. But we are worried about the future prosperity of the United States. Although many people assume that United States will always be a world leader in science and technology, this may not continue to be the case inasmuch as great minds and ideas exist throughout the world. We fear the abruptness with which a lead in science and technology can be lost—and the difficulty of recovering a lead once lost, if indeed it can be regained at all.

This Nation must prepare with great urgency to preserve its strategic and economic security. Because other nations have, and probably will continue to have, the competitive advantage of a low-wage structure, the United States must compete by optimizing its knowledge-based resources, particularly in science and technology, and by sustaining the most fertile environment for new and revitalized industries and the well-paying jobs they bring. We have already seen that capital, factories, and laboratories readily move wherever they are thought to have the greatest promise of return to investors.

RECOMMENDATIONS

The committee reviewed hundreds of detailed suggestions—including various calls for novel and untested mechanisms—from other committees, from its focus groups, and from its own members. The challenge is immense, and the actions needed to respond are immense as well.

The committee identified two key challenges that are tightly coupled to scientific and engineering prowess: Creating high-quality jobs for Americans and responding to the nation's need for clean, affordable, and reliable energy. To address those challenges, the committee structured its ideas according to four basic recommendations that focus on the human, financial, and knowledge capital necessary for U.S. prosperity.

The four recommendations focus on actions in K-12 education (10,000 Teachers, 10 Million Minds), research (Sowing the Seeds), higher education (Best and Brightest), and economic policy (Incentives for Innovation) that are set forth in the following sections. Also provided are a total of 20 implementation steps for reaching the goals set forth in the recommendations.

Some actions involve changes in the law. Others require financial support that would come from reallocation of existing funds or, if necessary, from new funds. Overall, the committee believes that the investments are modest relative to the magnitude of the return the Nation can expect in the creation of new high-quality jobs and in responding to its energy needs.

10,000 TEACHERS, 10 MILLION MINDS AND K-12 SCIENCE AND MATHEMATICS EDUCATION

Recommendation A: Increase America's talent pool by vastly improving K-12 science and mathematics education.

Implementation Actions. The highest priority should be assigned to the following actions and programs. All should be subjected to continuing evaluation and refinement as they are implemented:

Action A-1: Annually recruit 10,000 science and mathematics teachers by awarding 4-year scholarships and thereby educating 10 million minds. Attract 10,000 of America's brightest students to the teaching profession every year, each of whom can have an impact on 1,000 students over the life of their careers. The program would award competitive 4-year scholarships for students to obtain bachelor's degrees in the physical or life sciences, engineering, or mathematics with concurrent certification as K-12 science and mathematics teachers. The merit-based scholarships would provide up to \$20,000 a year for 4 years for qualified educational expenses, including tuition and fees, and require a commitment to 5 years of service in public K-12 schools. A \$10,000 annual bonus would go to participating teachers in underserved schools in inner cities and rural areas. To provide the highest-quality education for undergraduates who want to become teachers, it would be important to award matching grants, perhaps \$1 million a year for up to 5 years, to as many as 100 universities and colleges to encourage them to establish integrated 4-year undergraduate programs leading to bachelor's degrees in science, engineering, or mathematics with teacher certification.

Action A-2: Strengthen the skills of 250,000 teachers through training and education programs at summer institutes, in master's programs, and Advanced Placement and International Baccalaureate (AP and IB) training programs and thus inspires students every day. Use proven models to strengthen the skills (and compensation, which is based on education and skill level) of 250,000 current K-12 teachers:

Summer institutes: Provide matching grants to state and regional 1- to 2-week summer institutes to upgrade as many as 50,000 practicing teachers each summer. The material covered would allow teachers to keep current with recent developments in science, mathematics, and technology and allow for the exchange of best teaching practices. The Merck Institute for Science Education is a model for this recommendation.

Science and mathematics master's programs: Provide grants to universities to offer 50,000 current middle-school and high-school science, mathematics, and technology teachers (with or without undergraduate science, mathematics, or engineering degrees) 2-year, part-time master's degree programs that focus on rigorous science and mathematics content and pedagogy. The model for this recommendation is the University of Pennsylvania Science Teachers Institute.

AP, IB, and pre-AP or pre-IB training: Train an additional 70,000 AP or IB and 80,000 pre-AP or pre-IB instructors to teach advanced courses in mathematics and science. Assuming satisfactory performance, teachers may receive incentive payments of up to \$2,000 per year, as well as \$100 for each student who passes an AP or IB exam in mathematics or science. There are two models for this program: the Advanced Placement Incentive Program and Laying the Foundation, a pre-AP program.

K-12 curriculum materials modeled on world-class standards. Foster high-quality teaching with world-class curricula, standards, and assessments of student learning.

Convene a national panel to collect, evaluate, and develop rigorous K–12 materials that would be available free of charge as a voluntary national curriculum. The model for this recommendation is the Project Lead the Way pre-engineering courseware.

Action A-3: Enlarge the pipeline by increasing the number of students who take AP and IB science and mathematics courses. Create opportunities and incentives for middle-school and high-school students to pursue advanced work in science and mathematics. By 2010, increase the number of students in AP and IB mathematics and science courses from 1.2 million to 4.5 million, and set a goal of tripling the number who pass those tests, to 700,000, by 2010. Student incentives for success would include 50% examination fee rebates and \$100 mini-scholarships for each passing score on an AP or IB mathematics and science examination.

The committee proposes expansion of two additional approaches to improving K–12 science and mathematics education that are already in use:

Statewide specialty high schools. Specialty secondary education can foster leaders in science, technology, and mathematics. Specialty schools immerse students in high-quality science, technology, and mathematics education; serve as a mechanism to test teaching materials; provide a training ground for K–12 teachers; and provide the resources and staff for summer programs that introduce students to science and mathematics.

Inquiry-based learning. Summer internships and research opportunities provide especially valuable laboratory experience for both middle-school and high-school students.

SOWING THE SEEDS THROUGH SCIENCE AND ENGINEERING RESEARCH

Recommendation B: Sustain and strengthen the nation's traditional commitment to long-term basic research that has the potential to be transformational to maintain the flow of new ideas that fuel the economy, provide security, and enhance the quality of life.

Action B-1: Increase the federal investment in long-term basic research by 10% a year over the next 7 years, through reallocation of existing funds or if necessary through the investment of new funds. Special attention should go to the physical sciences, engineering, mathematics, and information sciences and to Department of Defense (DOD) basic-research funding. This special attention does not mean that there should be a disinvestment in such important fields as the life sciences (which have seen growth in recent years) or the social sciences. A balanced research portfolio in all fields of science and engineering research is critical to U.S. prosperity. This investment should be evaluated regularly to realign the research portfolio—unsuccessful projects and venues of research should be replaced with emerging research projects and venues that have greater promise.

Action B-2: Provide new research grants of \$500,000 each annually, payable over 5 years, to 200 of our most outstanding early-career researchers. The grants would be made through existing Federal research agencies—the National Institutes of Health (NIH), the National Science Foundation (NSF), the Department of Energy (DOE), DOD, and the National Aeronautics and Space Administration—to underwrite new research opportunities at universities and government laboratories.

Action B-3: Institute a National Coordination Office for Research Infrastructure to manage a centralized research-infrastructure fund of \$500 million per year over the next 5 years—through reallocation of existing funds

or if necessary through the investment of new funds—to ensure that universities and government laboratories create and maintain the facilities and equipment needed for leading-edge scientific discovery and technological development. Universities and national laboratories would compete annually for these funds.

Action B-4: Allocate at least 8% of the budgets of Federal research agencies to discretionary funding that would be managed by technical program managers in the agencies and be focused on catalyzing high-risk, high-payoff research.

Action B-5: Create in the Department of Energy (DOE) an organization like the Defense Advanced Research Projects Agency (DARPA) called the Advanced Research Projects Agency-Energy (ARPA-E). The director of ARPA-E would report to the under secretary for science and would be charged with sponsoring specific research and development programs to meet the nation's long-term energy challenges. The new agency would support creative “out-of-the-box” transformational generic energy research that industry by itself cannot or will not support and in which risk may be high but success would provide dramatic benefits for the nation. This would accelerate the process by which knowledge obtained through research is transformed to create jobs and address environmental, energy, and security issues. ARPA-E would be based on the historically successful DARPA model and would be designed as a lean and agile organization with a great deal of independence that can start and stop targeted programs on the basis of performance. The agency would itself perform no research or transitional effort itself but would fund such work conducted by universities, startups, established firms, and others. Its staff would turn over about every 4 years. Although the agency would be focused on specific energy issues, it is expected that its work (like that of DARPA or NIH) will have important spinoff benefits, including aiding in the education of the next generation of researchers. Funding for ARPA-E would start at \$300 million the first year and increase to \$1 billion per year over 5–6 years, at which point the program's effectiveness would be evaluated.

Action B-6: Institute a Presidential Innovation Award to stimulate scientific and engineering advances in the national interest. Existing presidential awards address lifetime achievements or promising young scholars, but the proposed new awards would identify and recognize persons who develop unique scientific and engineering innovations in the national interest at the time they occur.

BEST AND BRIGHTEST IN SCIENCE AND ENGINEERING HIGHER EDUCATION

Recommendation C: Make the United States the most attractive setting in which to study and perform research so that we can develop, recruit, and retain the best and brightest students, scientists, and engineers from within the United States and throughout the world.

Action C-1: Increase the number and proportion of U.S. citizens who earn physical sciences, life-sciences, engineering, and mathematics bachelor's degrees by providing 25,000 new 4-year competitive undergraduate scholarships each year to U.S. citizens attending U.S. institutions. The Undergraduate Scholar Awards in Science, Technology, Engineering, and Mathematics (USA-STEM) would be distributed to states on the basis of the size of their congressional delegations and awarded on the basis of national examinations. An award would provide up to \$20,000 annually for tuition and fees.

Action C-2: Increase the number of U.S. citizens pursuing graduate study in “areas of

national need” by funding 5,000 new graduate fellowships each year. NSF should administer the program and draw on the advice of other Federal research agencies to define national needs. The focus on national needs is important both to ensure an adequate supply of doctoral scientists and engineers and to ensure that there are appropriate employment opportunities for students once they receive their degrees. Portable fellowships would provide funds of up to \$20,000 annually directly to students, who would choose where to pursue graduate studies instead of being required to follow faculty research grants.

Action C-3: Provide a Federal tax credit to encourage employers to make continuing education available (either internally or through colleges and universities) to practicing scientists and engineers. These incentives would promote career-long learning to keep the workforce current in the face of rapidly evolving scientific and engineering discoveries and technological advances and would allow for retraining to meet new demands of the job market.

Action C-4: Continue to improve visa processing for international students and scholars to provide less complex procedures and continue to make improvements on such issues as visa categories and duration, travel for scientific meetings, the technology-alert list, reciprocity agreements, and changes in status.

Action C-5: Provide a 1-year automatic visa extension to international students who receive doctorates or the equivalent in science, technology, engineering, mathematics, or other fields of national need at qualified U.S. institutions to remain in the United States to seek employment. If these students are offered jobs by United States-based employers and pass a security screening test, they should be provided automatic work permits and expedited residence status. If students are unable to obtain employment within 1 year, their visas would expire.

Action C-6: Institute a new skills-based, preferential immigration option. Doctoral-level education and science and engineering skills would substantially raise an applicant's chances and priority in obtaining U.S. citizenship. In the interim, the number of H-1B visas should be increased by 10,000, and the additional visas should be available for industry to hire science and engineering applicants with doctorates from U.S. universities.

Action C-7: Reform the current system of “deemed exports”. The new system should provide international students and researchers engaged in fundamental research in the United States with access to information and research equipment in U.S. industrial, academic, and national laboratories comparable with the access provided to U.S. citizens and permanent residents in a similar status. It would, of course, exclude information and facilities restricted under national-security regulations. In addition, the effect of deemed-exports regulations on the education and fundamental research work of international students and scholars should be limited by removing all technology items (information and equipment) from the deemed-exports technology list that are available for purchase on the overseas open market from foreign or U.S. companies or that have manuals that are available in the public domain, in libraries, over the Internet, or from manufacturers.

INCENTIVES FOR INNOVATION AND THE INVESTMENT ENVIRONMENT

Recommendation D: Ensure that the United States is the premier place in the world to innovate; invest in downstream activities such as manufacturing and marketing; and create high-paying jobs that are

based on innovation by modernizing the patent system, realigning tax policies to encourage innovation, and ensuring affordable broadband access.

Action D-1: Enhance intellectual-property protection for the 21st century global economy to ensure that systems for protecting patents and other forms of intellectual property underlie the emerging knowledge economy but allow research to enhance innovation. The patent system requires reform of four specific kinds:

Provide the Patent and Trademark Office sufficient resources to make intellectual-property protection more timely, predictable, and effective.

Reconfigure the U.S. patent system by switching to a "first-inventor-to-file" system and by instituting administrative review after a patent is granted. Those reforms would bring the U.S. system into alignment with patent systems in Europe and Japan.

Shield research uses of patented inventions from infringement liability. One recent court decision could jeopardize the long-assumed ability of academic researchers to use patented inventions for research.

Change intellectual-property laws that act as barriers to innovation in specific industries, such as those related to data exclusivity (in pharmaceuticals) and those which increase the volume and unpredictability of litigation (especially in information-technology industries).

Action D-2: Enact a stronger research and development tax credit to encourage private investment in innovation. The current Research and Experimentation Tax Credit goes to companies that increase their research and development spending above a base amount calculated from their spending in prior years. Congress and the administration should make the credit permanent, and it should be increased from 20% to 40% of the qualifying increase so that the U.S. tax credit is competitive with that of other countries. The credit should be extended to companies that have consistently spent large amounts on research and development so that they will not be subject to the current de facto penalties for previously investing in research and development.

Action D-3: Provide tax incentives for United States-based innovation. Many policies and programs affect innovation and the nation's ability to profit from it. It was not possible for the committee to conduct an exhaustive examination, but alternatives to current economic policies should be examined and, if deemed beneficial to the United States, pursued. These alternatives could include changes in overall corporate tax rates, provision of incentives for the purchase of high-technology research and manufacturing equipment, treatment of capital gains, and incentives for long-term investments in innovation. The Council of Economic Advisers and the Congressional Budget Office should conduct a comprehensive analysis to examine how the United States compares with other nations as a location for innovation and related activities with a view to ensuring that the United States is one of the most attractive places in the world for long-term innovation-related investment. From a tax standpoint, that is not now the case.

Action D-4: Ensure ubiquitous broadband Internet access. Several nations are well ahead of the United States in providing broadband access for home, school, and business. That capability will do as much to drive innovation, the economy, and job creation in the 21st century as did access to the telephone, interstate highways, and air travel into the 20th century. Congress and the administration should take action—mainly in the regulatory arena and in spectrum management—to ensure widespread affordable broadband access in the near future.

CONCLUSION

The committee believes that its recommendations and the actions proposed to implement them merit serious consideration if we are to ensure that our nation continues to enjoy the jobs, security, and high standard of living that this and previous generations worked so hard to create. Although the committee was asked only to recommend actions that can be taken by the federal government, it is clear that related actions at the state and local levels are equally important for U.S. prosperity, as are actions taken by each American family. The United States faces an enormous challenge because of the disadvantage it faces in labor cost. Science and technology provide the opportunity to overcome that disadvantage by creating scientists and engineers with the ability to create entire new industries—much as has been done in the past.

It is easy to be complacent about U.S. competitiveness and pre-eminence in science and technology. We have led the world for decades, and we continue to do so in many research fields today. But the world is changing rapidly, and our advantages are no longer unique. Without a renewed effort to bolster the foundations of our competitiveness, we can expect to lose our privileged position. For the first time in generations, the nation's children could face poorer prospects than their parents and grandparents did. We owe our current prosperity, security, and good health to the investments of past generations, and we are obliged to renew those commitments in education, research, and innovation policies to ensure that the American people continue to benefit from the remarkable opportunities provided by the rapid development of the global economy and its not inconsiderable underpinning in science and technology.

SOME WORRISOME INDICATORS

When asked in spring 2005 what is the most attractive place in the world in which to "lead a good life", respondents in only one of the 16 countries polled (India) indicated the United States.

For the cost of one chemist or one engineer in the United States, a company can hire about five chemists in China or 11 engineers in India.

For the first time, the most capable high-energy particle accelerator on Earth will, beginning in 2007, reside outside the United States.

The United States is today a net importer of high-technology products. Its share of global high-technology exports has fallen in the last 2 decades from 30% to 17%, and its trade balance in high-technology manufactured goods shifted from plus \$33 billion in 1990 to a negative \$24 billion in 2004.

Chemical companies closed 70 facilities in the United States in 2004 and have tagged 40 more for shutdown. Of 120 chemical plants being built around the world with price tags of \$1 billion or more, one is in the United States and 50 in China.

Fewer than one-third of U.S. 4th grade and 8th grade students performed at or above a level called "proficient" in mathematics; "proficiency" was considered the ability to exhibit competence with challenging subject matter. Alarmingly, about one-third of the 4th graders and one-fifth of the 8th graders lacked the competence to perform basic mathematical computations.

U.S. 12th graders recently performed below the international average for 21 countries on a test of general knowledge in mathematics and science. In addition, an advanced mathematics assessment was administered to U.S. students who were taking or had taken precalculus, calculus, or Advanced Placement calculus and to students in 15 other

countries who were taking or had taken advanced mathematics courses. Eleven nations outperformed the United States, and four countries had scores similar to the U.S. scores. No nation scored significantly below the United States.

In 1999, only 41% of U.S. 8th grade students received instruction from a mathematics teacher who specialized in mathematics, considerably lower than the international average of 71%.

In one recent period, low-wage employers, such as Wal-Mart (now the nation's largest employer) and McDonald's, created 44% of the new jobs, while high-wage employers created only 29% of the new jobs.

In 2003, only three American companies ranked among the top 10 recipients of patents granted by the United States Patent and Trademark Office.

In Germany, 36% of undergraduates receive their degrees in science and engineering. In China, the figure is 59%, and in Japan 66%. In the United States, the corresponding figure is 32%.

The United States is said to have 10.5 million illegal immigrants, but under the law the number of visas set aside for "highly qualified foreign workers" dropped to 65,000 a year from its 195,000 peak.

In 2004, China graduated over 600,000 engineers, India 350,000, and America about 70,000.

In 2001 (the most recent year for which data are available), U.S. industry spent more on tort litigation than on R&D.

[From the New York Times, Oct. 14, 2005]

KEEPING US IN THE RACE

(By Thomas L. Friedman)

What if we were really having a national discussion about what is most important to the country today and on the minds of most parents?

I have no doubt that it would be a loud, noisy dinner-table conversation about why so many U.S. manufacturers are moving abroad—not just to find lower wages, but to find smarter workers, better infrastructure and cheaper health care. It would be about why in Germany, 36 percent of undergrads receive degrees in science and engineering; in China, 59 percent; in Japan, 66 percent; and in America, only 32 percent. It would be about why Japanese on bullet trains can get access to the Internet with cellphones, and Americans get their cellphone service interrupted five minutes from home.

It would be about why U.S. 12th graders recently performed below the international average for 21 countries in math and science, and it would be about why, in recent years, U.S. industry appears to have spent more on lawsuits than on R&D. Yes, we'd be talking about why the world is racing us to the top, not the bottom, and why we are quietly falling behind.

And late in the evening, as the wine bottles emptied, someone at the national dinner table might finally say: "Hey, what if we were really thinking ahead? What if we asked some of the country's best minds to make a list of the steps we could take right now to enhance America's technology base?"

Fortunately, two senators, Lamar Alexander and Jeff Bingaman, asked the National Academy of Sciences, the National Academy of Engineering and the Institute of Medicine to form a bipartisan study group to produce just such a list, which was released on Wednesday in a report called "Rising Above the Gathering Storm."

Because of globalization, the report begins, U.S. "workers in virtually every sector must now face competitors who live just a mouse-click away in Ireland, Finland, India or dozens of other nations whose economies are growing. Having reviewed the trends in the

United States and abroad, the committee is deeply concerned that the scientific and technical building blocks of our economic leadership are eroding at a time when many other nations are gathering strength. We are worried about the future prosperity of the United States. We fear the abruptness with which a lead in science and technology can be lost and the difficulty of recovering a lead once lost—if indeed it can be regained at all.”

The report’s key recommendations? Nothing fancy. Charles Vest, the former president of M.I.T., summed them up: “We need to get back to basic blocking and tackling”—educating more Americans in the skills needed for 21st-century jobs.

Among the top priorities, the report says, should be these:

(1) Annually recruiting 10,000 science and math teachers by awarding four-year merit-based scholarships, to be paid back through five years of K–12 public school teaching. (We have too many unqualified science and math teachers.)

(2) Strengthening the math and science skills of 250,000 other teachers through extra-curricular programs.

(3) Creating opportunities and incentives for many more middle school and high school students to take advanced math and science courses, by offering, among other things, \$100 mini-scholarships for success in exams, and creating more specialty math-and-science schools.

(4) Increasing federal investment in long-term basic research by 10 percent a year over the next seven years.

(5) Annually providing research grants of \$500,000 each, payable over five years, to 200 of America’s most outstanding young researchers.

(6) Creating a new Advanced Research Projects Agency in the Energy Department to support “creative out-of-the-box transformational energy research that industry by itself cannot or will not support and in which risk may be high, but success would provide dramatic benefits for the nation.”

(7) Granting automatic one-year visa extensions to foreign students in the U.S. who receive doctorates in science, engineering or math so they can seek employment here, and creating 5,000 National Science Foundation-administered graduate fellowships to increase the number of U.S. citizens earning doctoral degrees in fields of “national need.” (See the rest at www.nationalacademies.org <<http://www.nationalacademies.org>>.)

These proposals are the new New Deal urgently called for by our times. This is where President Bush should have focused his second term, instead of squandering it on a silly, ideological jag called Social Security privatization. Because, as this report concludes, “Without a renewed effort to bolster the foundations of our competitiveness, we can expect to lose our privileged position.”

CONCLUSION OF MORNING BUSINESS

The PRESIDING OFFICER. Under the previous order, morning business is closed.

TRANSPORTATION, TREASURY, THE JUDICIARY, HOUSING AND URBAN DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS ACT, 2006

The PRESIDING OFFICER. Under the previous order, the hour of 3 p.m. having arrived, the Senate will proceed

to the consideration of H.R. 3058, which the clerk will report.

The legislative clerk read as follows:

A bill (H.R. 3058) making appropriations for the Departments of Transportation, Treasury, and Housing and Urban Development, the Judiciary, the District of Columbia, and independent agencies for the fiscal year ending September 30, 2006, and for other purposes.

The Senate proceeded to consider the bill which had been reported from the Committee on Appropriations with an amendment.

(Strike the part shown in black brackets and insert the part shown in *italic*.)

H.R. 3058

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the Departments of Transportation, Treasury, and Housing and Urban Development, the Judiciary, District of Columbia, and independent agencies for the fiscal year ending September 30, 2006, and for other purposes, namely:

TITLE I

DEPARTMENT OF TRANSPORTATION

OFFICE OF THE SECRETARY

SALARIES AND EXPENSES

For necessary expenses of the Office of the Secretary, \$84,913,000 (increased by \$250,000) (reduced by \$17,339,000), of which not to exceed \$2,198,000 shall be available for the immediate Office of the Secretary; not to exceed \$698,000 shall be available for the immediate Office of the Deputy Secretary; not to exceed \$15,183,000 (increased by \$250,000) shall be available for the Office of the General Counsel; not to exceed \$11,680,000 shall be available for the Office of the Under Secretary of Transportation for Policy; not to exceed \$7,593,000 shall be available for the Office of the Assistant Secretary for Budget and Programs; not to exceed \$2,052,000 (reduced by \$2,052,000) shall be available for the Office of the Assistant Secretary for Governmental Affairs; not to exceed \$23,139,000 shall be available for the Office of the Assistant Secretary for Administration; not to exceed \$1,910,000 (reduced by \$1,910,000) shall be available for the Office of Public Affairs; not to exceed \$1,442,000 (reduced by \$1,422,000) shall be available for the Office of the Executive Secretariat; not to exceed \$697,000 shall be available for the Board of Contract Appeals; not to exceed \$1,265,000 shall be available for the Office of Small and Disadvantaged Business Utilization; not to exceed \$2,033,000 for the Office of Intelligence and Security; not to exceed \$3,128,000 shall be available for the Office of Emergency Transportation; and not to exceed \$11,895,000 (reduced by \$11,895,000) shall be available for the Office of the Chief Information Officer: *Provided*, That the Secretary of Transportation is authorized to transfer funds appropriated for any office of the Office of the Secretary to any other office of the Office of the Secretary: *Provided further*, That no appropriation for any office shall be increased or decreased by more than 5 percent by all such transfers: *Provided further*, That notice of any change in funding greater than 5 percent shall be submitted for approval to the House and Senate Committees on Appropriations: *Provided further*, That not to exceed \$60,000 (reduced by \$60,000) shall be for allocation within the Department for official reception and representation expenses as the Secretary may determine: *Provided further*, That notwithstanding any other provision of law, ex-

cluding fees authorized in Public Law 107-71, there may be credited to this appropriation up to \$2,500,000 in funds received in user fees: *Provided further*, That none of the funds provided in this Act shall be available for the position of Assistant Secretary for Public Affairs.

OFFICE OF CIVIL RIGHTS

For necessary expenses of the Office of Civil Rights, \$8,550,000.

TRANSPORTATION PLANNING, RESEARCH, AND DEVELOPMENT

For necessary expenses for conducting transportation planning, research, systems development, development activities, and making grants, to remain available until expended, \$40,613,000 (reduced by \$31,583,000).

WORKING CAPITAL FUND

Necessary expenses for operating costs and capital outlays of the Working Capital Fund, not to exceed \$120,014,000, shall be paid from appropriations made available to the Department of Transportation: *Provided*, That such services shall be provided on a competitive basis to entities within the Department of Transportation: *Provided further*, That the above limitation on operating expenses shall not apply to non-DOT entities: *Provided further*, That no funds appropriated in this Act to an agency of the Department shall be transferred to the Working Capital Fund without the approval of the agency modal administrator: *Provided further*, That no assessments may be levied against any program, budget activity, subactivity or project funded by this Act unless notice of such assessments and the basis therefor are presented to the House and Senate Committees on Appropriations and are approved by such Committees.

MINORITY BUSINESS RESOURCE CENTER PROGRAM

For the cost of guaranteed loans, \$500,000, as authorized by 49 U.S.C. 332: *Provided*, That such costs, including the cost of modifying such loans, shall be as defined in section 502 of the Congressional Budget Act of 1974: *Provided further*, That these funds are available to subsidize total loan principal, any part of which is to be guaranteed, not to exceed \$18,367,000. In addition, for administrative expenses to carry out the guaranteed loan program, \$400,000.

MINORITY BUSINESS OUTREACH

For necessary expenses of Minority Business Resource Center outreach activities, \$3,000,000, to remain available until September 30, 2007: *Provided*, That notwithstanding 49 U.S.C. 332, these funds may be used for business opportunities related to any mode of transportation.

PAYMENTS TO AIR CARRIERS

(AIRPORT AND AIRWAY TRUST FUND)

In addition to funds made available from any other source to carry out the essential air service program under 49 U.S.C. 41731-41742, \$54,000,000 to remain available until expended: *Provided*, That the Secretary may transfer amounts appropriated to the Federal Aviation Administration under any heading in this Act or otherwise available to the Federal Aviation Administration, to make such amounts available for obligation and expenditure for the essential air service program, in satisfaction of the requirements of section 41742(a)(1) of title 49, United States Code, in advance of the collection of fees under section 45301 of title 49, United States Code: *Provided further*, That the Secretary shall reimburse such amounts to the Federal Aviation Administration proportionally by transfer, to the extent possible, from amounts credited to the account established under section 45303 of title 49, United States